

WHITEPAPER

Can the NHS harness the potential of AI?





Standfirst:

Artificial intelligence is starting to impact how we all live and work, and the healthcare space is no exception. But while there are significant opportunities in terms of efficiencies, effective triage and even diagnosis, there are also issues that must be overcome before it becomes widely adopted

£123m

The amount the government has invested in 86 AI technologies

94%

The proportion of correct decisions made by AI in an eye disease trial, matching those by leading experts

£21m

The additional amount pledged by the government to help fund AI diagnostic technologies

30m

The number of outpatient appointments that could be saved by more effective triaging as a result of AI, the NHS estimates



The topic of artificial intelligence (AI) has gained plenty of publicity in recent years, particularly since the emergence of large language models such as ChatGPT. Much of the attention has focused on how this might affect businesses, potentially freeing up time and improving efficiency, as well as creating obvious concerns around jobs.

In the health sector, though, the use of AI has been more gradual, and often unnoticed. [The NHS is under huge pressure](#) – both financial and operational in terms of workload, which then in turn affects staffing and recruitment – and the pandemic only served to exacerbate these issues.

AI has huge potential to help here, in replacing some of the tasks that have hitherto been done by humans. **“With AI, we’re still very early in the maturity curve, and there’s still a lot to be learned about its potential and how we might use that technology to deliver better outcomes,”** says Andrew Henderson, chief technology officer at OneAdvanced. **“In the NHS, that could be everything from diagnostics to scheduling and shift management efficiency, and that means more funding can be made available for patient care.”**

There’s no doubt the UK government sees AI as part of the solution. Back in 2019, its then chief executive Simon Stevens pledged to make up to 30 million outpatient appointments unnecessary through the use of AI, saving over £1 billion, as part of the NHS’s [Long Term Plan](#).

Since then, [the government has invested £123 million into 86 AI technologies](#) through the Artificial Intelligence in Health and Care Award scheme, ranging from supporting stroke diagnosis, screening, cardiovascular monitoring and managing conditions at home.

In June 2023, as part of the NHS’s 75th birthday commemorations, it unveiled a [new £21 million AI Diagnostic fund](#) to accelerate the development of the most promising AI technologies from a diagnostic perspective. Any future [Labour government would also look to make use of AI](#) as part of its efforts to improve efficiency and help solve the NHS workforce issues.

Despite all this, progress has not been as rapid as it has in other sectors. There are good reasons for this, says Niels Peek, professor of data science and healthcare improvement at

The Healthcare Improvement Studies (THIS) Institute, part of the University of Cambridge. “It’s been a bit of a rollercoaster for AI over the last 10 years, with lots of developments coming from the AI industry and research,” he says. “But the translation of that to clinical practice, and making sure that the technology has actual benefits for the NHS, is a slow process.

“It takes typically years to gather evidence that things are working as they should, and sometimes we find out that they’re not and then you’re almost back to square one. On the technology side, new things happen every couple of years but on the healthcare side of things it takes a decade, at the very least, to gather the evidence, find out how we integrate things into clinical practice and start getting the benefits.”



Current applications

There are cases where AI is starting to deliver tangible impacts in the healthcare sector. In the primary care space, PATCHS allows patients to contact GPs online but also by telephone and uses AI to identify the issue and direct them to appropriate sources of support, including booking a face-to-face appointment if necessary.

The system has been developed by OneAdvanced, working alongside Dr Ben Brown, a practising GP, clinical senior lecturer at the University of Manchester, and co-founder and chief medical officer of PATCHS Health Ltd. **“The benefit of our approach is that we enable patients to communicate with GP practices using natural language,”** explains Brown.

“These systems have been around for a few years but they typically took a rules-based approach, where a human programmes a piece of software with a series of decision rules to then lead to a destination. The problem with that is that they’re quite inflexible and they often ask irrelevant questions.” Instead, true AI makes use of machine learning, which enables patients to enter text or talk to the system as they would with a human.

This also allows the system to learn natural language and build up data from each experience, which can be used to help inform future outcomes, in much the same way that a human would acquire more knowledge.

The ability to contact GPs over the phone rather than a smart phone or computer means those who might not be comfortable with technology can still call in the usual way. **“Patients get the benefit of these online consultations without having to use their computer, but it also helps the GP practice**

because it cuts their call-waiting pretty much to zero,” explains Brown.

“There’s a new GP contract that’s just been announced, and one of the things they will be monitored on is how long patients are waiting on the phone. Our AI solution can handle thousands of calls simultaneously, and it’s also cheaper than a receptionist.” The system also allows two-way communication, meaning GPs can reply to patients, including in different languages.

Other potential use cases for AI focus around efficiency, in much the same way as they might for any business. **“There could be massive potential benefits from AI coming from reducing the admin burden on clinicians and, more generally, NHS staff,”** says Peek.

An example here is the drafting of letters, which is a time-consuming process that often involves significant amounts of duplicated work. **“That’s a very interesting area and it’s only emerged very recently with large language models,”** says Peek. **“People spend so much time writing letters and it’s not the most interesting thing to do. It should be do-able but it’s still very early days.”**

Similarly, extracting and summarising data from millions of clinical documents in primary care using AI has the potential to transform GP services by reducing the time that every GP spends reading correspondence. An example here is the OneAdvanced’s Docman AI solution, which will incorporate AI functionality to help each GP to view an abbreviated summary of the 500 clinical documents they receive on average every day.



Technical decision

Then there's the whole diagnostic space. Some of the technologies that have received funding through the Artificial Intelligence in Health and Care Award scheme include [analysis of X-ray images](#) to free up radiologists when making assessments; and supporting people in [virtual wards](#) where they can be cared for in their own home or place of residence. An AI system trialled at Moorfields Eye Hospital, London, found it made the correct referral decision for over 50 eye diseases with 94% accuracy, matching the performance of the world's best eye experts.

There's already been significant use of AI in stroke diagnosis, and the government has pledged to increase the use of such technology to all stroke networks. **"In stroke care, AI is already in use in more than four out of five stroke networks, helping clinicians to reduce the time to deliver effective treatment by an hour, tripling the number of stroke patients recovering with no or**

only slight disability from one in six, to just under half," said Amanda Pritchard, chief executive of NHS England, [back in June 2023](#).

"And in cancer, we are rolling out AI teledermatology capability which can predict with 99.7% accuracy whether a skin lesion is likely to be cancerous or not, speeding up diagnosis and treatment for patients." The AI Diagnostic Fund will also include the use of AI tools to [analyse chest X-rays](#).

Other developments will follow. **"AI is going to start by building much faster and more effective experiences for patients,"** suggests Henderson. **"That's an operational improvement internally, and faster access to results and treatment plans for customers. In time, we'll see a convergence of AI with exponential technologies like quantum computing for materially faster invention of new treatments and new drug therapies, which will be transformational."**





Causes for concern

And yet there are also challenges that need to be overcome before the use of AI in healthcare can become widespread. One of the biggest is the potential for unconscious bias to be factored into programmes and the decisions AI technology makes.

“AI is machine learning,” points out Peeks. **“It’s a way to programme a computer to do things without having to specify all the steps that are needed to complete that task. We just need examples from real-world data and the computer will learn the algorithms that sit behind that.”**

“The problem is that with all the datasets that come from the real world, there are going to be issues around accuracy. But if there are any biases against minority groups those will also be replicated. Very often that will happen without us being aware of it. We may never know or we might find out years later.” While some elements, in time, may be able to function without human intervention, there should always be a human involved in diagnoses, he argues.

Effective patient communication is also essential if there is to be widespread acceptance of the use of AI in healthcare settings. **“The way to do that is to explain the different challenges we’re seeing and how we’re solving them with AI, and to make it tangible through real examples,”** says Henderson. **“Perhaps AI can help get a diagnostic result interpreted and treatment plan developed in minutes instead of days. If we can communicate in terms of outcomes, this will go a long way to helping people understand the value.”**

Brown believes more needs to be done to demonstrate the potential benefits of AI to staff, as well as patients. **“The reason why staff are often sceptical is that there isn’t the evidence to show that this is helping them,”** he says. **“The only way that happens is through scientific study.”**

“There are a lot of products out there that make claims but they haven’t written scientific papers, subjected their findings to peer review and been published in reputable journals. Once you can present that robust evidence, it goes a long way in healthcare, because it’s an evidence-based industry.” AI systems also need to be able to explain how they have arrived at a particular decision, he adds; something that is generally easier in rules-based systems rather than those based on machine learning.

But for those in healthcare settings, there are risks too in failing to consider the potential that stems from AI, believes Henderson. **“Out of all the technologies that have emerged in the last 15 years, this is the one where you need to be actively considering how you can leverage it effectively,”** he says. **“It’s going to be a massive accelerator of productivity and delivery of outcomes, and that will mean patients getting the support they need much faster. That’s going to be the fundamental driver for the adoption of AI.”**

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AI in healthcare timeline

1955

The first reference to AI is made, in a conference proposal by Dartmouth College. It suggested “every aspect of learning or any other feature of intelligence can in principle be so precisely described that a machine can be made to simulate it”

1970's

The MYCIN system, which uses artificial intelligence to identify bacteria likely to cause serious infections, is created at Stanford University

The University of Pittsburg develops Internist-I, designed to help diagnose conditions based on signs and symptoms, laboratory results and other items of patient history

1978

Rutgers University develops the causal-associational network (CASNET) model, using statistical pattern recognition and AI for glaucoma consultations

1989

Cardiologists at Cedars-Sinai develop CorSage, a clinical tool that combines AI and statistical techniques to help physicians identify heart patients who are most likely to suffer another coronary event

1990 - 2003

The Human Genome Project provides a wealth of data around human DNA and the genetic basis of disease

2015

The chatbot Pharmabot is launched, to help prescribe and suggest generic medicines for children

2019

The US Food and Drug Administration approves the first AI-powered device for cancer diagnosis, as well as a deep-learning algorithm for interpretation of brain MRIs



2020

The UK unveils the first winners of its Artificial Intelligence (AI) in Health and Care Award. To date, 86 innovations have received funding of £123 million

2021

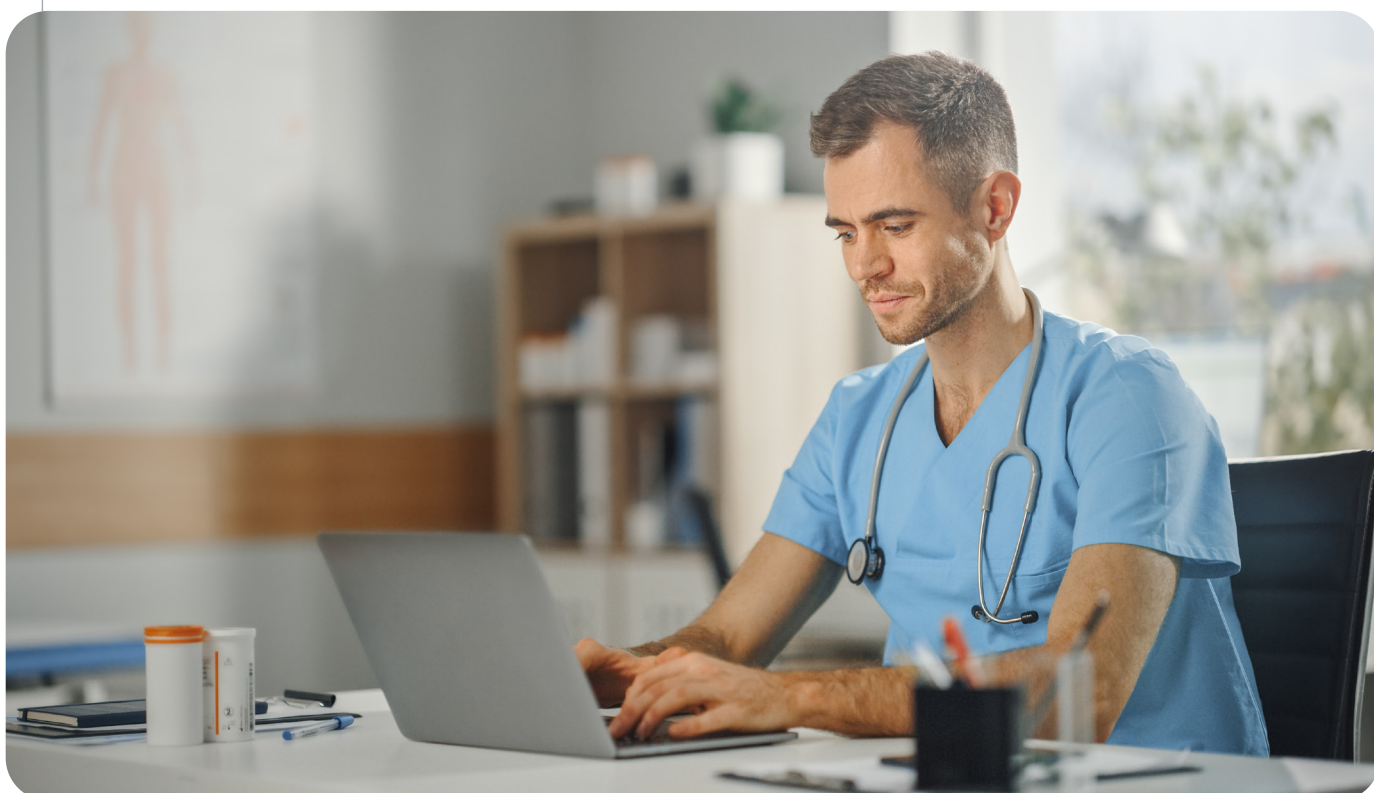
OneAdvanced and PATCHS Health launch the online consultation solution PATCHS, a means of enabling patients to access computer and telephone-based triaging, powered by AI

2022

A patient at Moorfields Eye Hospital NHS Foundation Trust becomes the first in the UK to trial a new implant using AI algorithms

2023

The UK government announces a £21 million fund to help roll out AI across the NHS, and promises to deploy AI decision-support tools in all stroke networks improve diagnosis and access to treatment





Six top AI terms



Artificial intelligence:

The design and study of machines that can perform tasks that would previously have required human (or other biological) brainpower



Machine learning:

A field of AI involving computer algorithms that can 'learn' by finding patterns in sample data. The algorithms then typically apply these findings to new data to make predictions or guide a robot in a new setting



Chatbot:

A software application designed to mimic human conversation, allowing it to talk to users via text or speech



Data:

Any information that has been collected for analysis or reference. Data can take the form of numbers and statistics, text, symbols or multimedia such as images, videos, sounds and maps



Large language model:

A type of foundation model that is trained on a vast amount of textual data to carry out language-related tasks. Large language models power the new generation of chatbots, and can generate text that is indistinguishable from human-written text



Natural language processing:

A field of AI that uses computer algorithms to analyse or synthesise human speech and text. Applications include speech-to-text converters, chatbots, speech recognition, automatic translation and sentiment analysis (identifying the mood of a piece of text)

Powering the world of work

OneAdvanced is a leading provider of sector-focused software, headquartered in Birmingham, UK. Our mission is to power the world of work through software that effortlessly gets the job done for our customers giving them the freedom to focus on thriving for their customers and people.

Customers trust OneAdvanced to deliver digitalisation through innovative technology, addressing business problems through intelligent insight. Our years of sector knowledge means we are a strategic partner to our customers, who use technology that touches the lives of millions of people every day. From caring for patients in the NHS and social care to meeting tenants housing needs; supporting learners in education and apprenticeships to navigating complex legal matters; and making sure goods get to their destination on time navigating complex supply chains.

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